TVP Stats Bulletin

U.S. DOE-EPRI Wind Turbine Verification Program

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KEA Expansion Underway

Kotzebue Electric Association (KEA) recently completed the installation of its North Wind 100 turbine (NW100). Representatives from Northern Power Systems and NREL assisted with the installation in late April. The new turbine was commissioned the week of May 6.

The NW100 is a 100 kW direct-drive wind turbine designed for cold climate conditions, remote villages, and distributed generation. The direct-drive generator eliminates the need for a gearbox and the related maintenance and repairs that can be problematic in harsh remote environments. The tubular tower houses the control panel and is equipped with an inside ladder for access to the nacelle. This enclosed tower provides shelter from the harsh weather during many repair and maintenance activities.

Foundations for two additional AOC 15/50 turbines have also been installed. These two new AOC turbines will be have with fiberglass blades, unlike KEA's ten existing turbines, which have wood-epoxy blades.

The addition of these three turbines, which will be incorporated into the TVP, will increase the total installed capacity from 0.66 MW to 0.89 MW, a 35% increase. Annual wind energy is expected to increase from 1,185 MWh to 1,600 MWh, representing approximately 7% of KEA's annual energy demand. To accommodate increasing wind penetration, KEA is installing a system-wide SCADA system to monitor and control their diesel power plant. Installed wind capacity is expected to reach 2-4 MW, providing as much as 33% of KEA's annual energy demand. KEA's project expansion is a reflection of their continuing commitment to lower electricity costs for this community of 3,500 residents, reduce environmental risks associated with using diesel fuel, increase self-reliance using indigenous resources, and promote wind energy development in Northwest Alaska. ◈

NW100 Nacelle Installation

TVP Releases 1st Quarter 2002 Performance and Wind Data

Recent monthly performance figures and accompanying wind speeds for the two current TVP wind projects; Kotzebue, AK, and Buffalo Mt., TN; and three graduated TVP wind projects; Algona, IA; Springview, NE, and Glenmore, WI, are reported in this *TVP Bulletin*. The five projects combined produced a total output of more than 6.4 million kWh of electricity during the first quarter of 2002.

Calculated quarterly capacity factors (CF) and the specific yield of each turbine's swept area (kWh/m^2) provide a baseline for comparing how each turbine is operating in the varied wind resources. The Algona project had the highest performance this quarter, with 386.0 kWh/m^2 and a 46.8% CF. Both the Algona and Springview projects have achieved impressive CFs above 40% during the last two quarters. The two projects' exceptional performance can be attributed to strong seasonal winds and high availability, over 97% for the last two quarters. ◈

Recently Published! 2001 TVP Reports

- ***Wisconsin Low Wind Speed Turbine Project Third-Year Operating Experience: 2000-2001***
- ***Kotzebue Electric Association Wind Power Project Second-Year Operating Experience: 2000-2001***
- ***Iowa/Nebraska Wind Generation Projects First- and Second-Year Operating Experience: 1999-2001***
- ***Big Spring Wind Power Project Second-Year Operating Experience: 2000-2001***

1st Quarter 2002 *TVP STATS*

Kotzebue, AK: Kotzebue Electric Association — **Atlantic Orient AOC 15/50:** T1-3 energized Jul-97; T4-10 energized May-99

Turbine	Swept Area (m^2)	Jan-02 kWh	Feb-02 kWh	Mar-02 kWh	1st Qtr-02 kWh	Quarter CF	Qtr kWh/m^2	2001 kWh	2001 CF	2001 kWh/m2
1	176.7	9,805	9,120	20,486	39,411	27.6%	223.0	89,591	15.5%	507
2	176.7	8,998	8,386	18,424	35,807	25.1%	202.6	86,090	14.9%	487
3	176.7	7,535	0	5,842	13,377	9.4%	75.7	45,610	7.9%	258
4	176.7	9,875	9,311	20,054	39,240	27.5%	222.1	92,176	15.9%	522
5	176.7	10,542	5,617	16,986	33,146	23.3%	187.6	85,990	14.9%	487
6	176.7	10,366	9,954	19,744	40,064	28.1%	226.7	93,887	16.2%	531
7	176.7	11,544	2,638	11,027	25,210	17.7%	142.7	88,081	15.2%	498
8	176.7	8,800	7,561	17,143	33,504	23.5%	189.6	87,113	15.1%	493
9	176.7	8,697	7,163	21,644	37,504	26.3%	212.2	91,008	15.7%	515
10	176.7	11,507	9,343	21,603	42,453	29.8%	240.3	96,109	16.6%	544
Project Totals	1767.0	69,092	97,671	172,953	339,716	23.8%	192.3	855,653	14.8%	484
Rating	**66 kW**	**Jan-02 WS (m/s)**	**Feb-02 WS (m/s)**	**Mar-02 WS (m/s)**	**Qtr WS (m/s)**			**2001 WS (m/s)**		
Mean hub height (26.5 m) WS		6.5	5.1	9.0	6.9			5.7		

** KEA's turbines are rated by the manufacturer at 50 kW, but capacity factors are based on their sustained power output of 66 kW.*

Buffalo Mountain, TN: Tennessee Valley Authority — **Vestas V47:** Energized Sep-00, Full Commercial Operation Apr-01

Turbine	Swept Area (m^2)	Jan-02 kWh	Feb-02 kWh	Mar-02 kWh	1st Qtr-02 kWh	Quarter CF	Qtr kWh/m^2	2001 kWh	2001 CF	2001 kWh/m2
1	1,735.6	185,070	137,238	181,776	504,084	35.4%	290.4	1,239,579	21.4%	714
2	1.735.6	175.432	135.807	171.154	482.393	33.8%	277.9	1.224.469	21.2%	705
3	1,735.6	176,073	128,391	176,164	480,628	33.7%	276.9	1,108,205	19.2%	638
Project Totals	5,206.9	536,575	401,436	529,094	1,467,105	34.3%	281.8	3,572,253	20.6%	686
Rating	**750 kW**	**Jan-02 WS (m/s)**	**Feb-02 WS (m/s)**	**Mar-02 WS (m/s)**	**Qtr WS (m/s)**			**2001 WS (m/s)**		
Mean (50 m) WS		8.1	7.8	8.3	8.1			6.3		

Algona, IA: Cedar Falls (primary owner), Algona Municipal Utilities (host) — **Zond Z-50:** Energized Sept-98

Turbine	Swept Area (m^2)	Jan-02 kWh	Feb-02 kWh	Mar-02 kWh	1st Qtr-02 kWh	Quarter CF	Qtr kWh/m^2	2001 kWh	2001 CF	2001 kWh/m2
1	1,963.5	227,853	293,937	259,642	781,432	48.2%	398.0	2,186,872	33.3%	1,114
2	1,963.5	222,389	281,879	252,978	757,246	46.7%	385.7	2,202,473	33.5%	1,122
3	1,963.5	215,612	271,277	247,917	734,806	45.4%	374.2	2,150,912	32.7%	1,095
Project Totals	5,890.5	665,854	847,093	760,537	2,273,484	46.8%	386.0	6,540,257	33.2%	1,110
Rating	**750 kW**	**Jan-02 WS (m/s)**	**Feb-02 WS (m/s)**	**Mar-02 WS (m/s)**	**Qtr WS (m/s)**			**2001 WS (m/s)**		
Mean hub height (50 m) WS		7.7	9.3	8.3	8.4			7.1		

Springview, NE: Nebraska Public Power District (primary owner), KBR (host) — **Zond Z-50:** Energized Oct-98 *

Turbine	Swept Area (m^2)	Jan-02 kWh	Feb-02 kWh	Mar-02 kWh	1st Qtr-02 kWh	Quarter CF	Qtr kWh/m^2	2001 kWh	2001 CF	2001 kWh/m2
1	1,963.5	266,695	271,492	207,371	745,558	46.0%	379.7	2,455,900	37.4%	1,251
2	1,963.5	262,633	237,979	181,540	682,152	42.1%	347.4	2,517,067	38.3%	1,282
Project Totals	3,927.0	529,328	509,471	388,911	1,427,710	44.1%	363.6	4,972,967	37.8%	1,266
Rating	**750 kW**	**Jan-02 WS (m/s)**	**Feb-02 WS (m/s)**	**Mar-02 WS (m/s)**	**Qtr WS (m/s)**			**2001 WS (m/s)**		
Mean hub height (65 m) WS		8.5	9.3	6.4	8.1			7.8		

** NPPD turbines were released for full power operation in late Jan-99.*

Glenmore, WI: Wisconsin Public Service — **Tacke 600e:** Energized Feb-98

Turbine	Swept Area (m^2)	Jan-02 kWh	Feb-02 kWh	Mar-02 kWh	1st Qtr-02 kWh	Quarter CF	Qtr kWh/m^2	2001 kWh	2001 CF	2001 kWh/m2
1	1,661.9	155,146	163,631	158,207	476,984	36.8%	287.0	1,115,182	21.2%	671
2	1,661.9	144,274	161,204	126,219	431,697	33.3%	259.8	1,233,694	23.5%	742
Project Totals	3,323.8	299,419	324,835	284,426	908,680	35.1%	273.4	2,348,876	22.3%	707
Rating	**600 kW**	**Jan-02 WS (m/s)**	**Feb-02 WS (m/s)**	**Mar-02 WS (m/s)**	**Qtr WS (m/s)**			**2001 WS (m/s)**		
Mean hub height (60 m) WS		8.0	8.2	7.4	7.8			6.8		

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